Reprint **ISSN 1997-2571 (Web Version)**

Journal of Innovation & Development Strategy (JIDS)

(J. Innov. Dev. Strategy)

Volume: 5 **Issue: 2** **August 2011**

J. Innov. Dev. Strategy 5(2):53-55(August 2011)

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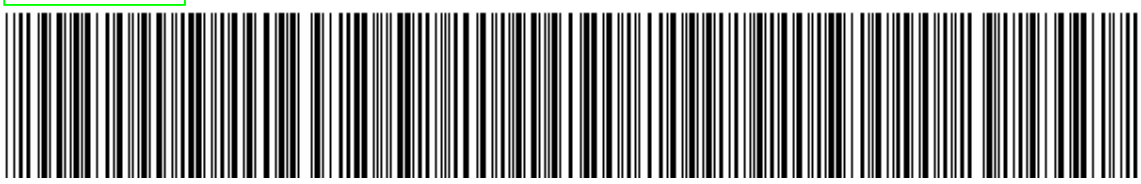

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Accepted for publication on 14 August 2011

ABSTRACT

Sattar MA, Shamim ANM, Afroz N (2011) Physical impacts on the improvement of jute furnishing fabrics. *J. Innov. Dev. Strategy* 5(2), 53-55.

To evaluate the performance efficiency of Jute furnishing fabrics produced in the weaving department of the Mechanical Processing Division, Bangladesh Jute Research Institute, Dhaka, Bangladesh for further development and standardization, three different fabrics (plain 1/1, Twill 2/1 and Twill 3/2) were taken for investigation with respect to weight, strength, abrasion and stiffness. All the physical and mechanical properties of the above mentioned fabrics determined as per British Standard test method. Twill 3/2 fabric is most suitable for furnishing as jute furnishing fabric since its resultant parameters are far better than plain 1/1 and Twill 2/1.

Key words: *weaving, design, strength, furnishing fabrics*

INTRODUCTION

Jute is one of the major cash crops of the country and about 1.2 million farmers are directly associated with its cultivation. Almost one seventh of the total populations of the country are involved in Jute production, transportation, processing and marketing either directly or indirectly (Hadina and Kovacevic, 1998). The June sector provides about 10% of total employment in the economy (Hearle and Thakur, 1961). Jute plays a dominant role in the economy of Bangladesh. Jute is the one crop that is of unique nature and singular importance among the various field cash crops of Bangladesh. Jute and Jute based goods earn as much as about 7% of the country's foreign exchange annually. Jute is the cheapest natural textile fabric used for manufacturer of different jute goods which were highly in demand in foreign markets but with the invention of synthetic, jute has lost its traditional market considerably (Balasubramanian and Bhatnagar, 1970).

It is, therefore, now realized that the idea to have excessive reliance on the production of traditional/ conventional products like hessians, sackings and carpet backing should have to be reviewed in the face of the challenge from newly developed rival synthetic products. In this situation, alternative uses of jute in diversified forms (such as novotex fabric) especially for the manufacture of value-added products having much commercial value and great demand at home and abroad markets needs to explore. Novotex fabrics are finding increasing application as furnishing fabric and also there is interest in extending usage into other domestic purposes such as curtain cloth, bed cover, sofa bag, table cloth, table lamp shade, floor cushion, chair cushion and wearing apparels (Lin and Chang, 2004).

As this depends on obtaining satisfactory performance in various important physical properties namely fabric strength, abrasion resistance, drape, stiffness, rubbing/ washing etc. and an experimental investigation was done on strength, abrasion and stiffness for the evaluation of the performance of Novotex fabric (Hearle *et al.* 1959).

MATERIALS AND METHODS

Three types of fabric *viz.* plain 1/1, twill 2/1 and twill 3/2, were woven for this experiment on a Rapier loom having 220 p.p.m, by using 20 s/2 ply cotton yarn as warp and 238.75 tex (7.5 Ibs/spy) jute yarn as weft, after weaving and finishing, the fabric properties were tested in the testing department at the standard atmospheric conditions of (65 ± 2%) relative humidity and (20 ± 2)^{0}C temperature. The test samples were taken randomly throughout ten (10) meters of each weave pattern of the fabric and ten (10) tests were carried out from each sample. The size of test specimen for textile strength was 30.48 x 5.08cm (12″×2″) and the test were carried out on Good brand cloth tensile strength testing machine at the rate of 45.72 cm (18″) traverse per minute. The results are shown in the table-2.

Abrasion test were made on Martindale Abrasion testing machine. In this machine a flat sample of fabric stretched over the face of a circular holder is rubbed against a suitable flat abrasive surface (Lodi and Shahabuddin, 1986).

A total weight of 395.35gm applied to the specimen who moves over the abrading with a motion that is continually changing direction and the counter counts the number of revs/stroke required for a definite end point change of appearance or color is important (Weijers *et al.* 1984). The worsted cloth was used as standard method. The results are shown in the table-3.

Table 1. Physical Properties of Jute & Cotton Yarn

Properties	Jute	Cotton
Fineness (tex) Note-1	2.2	0.2
Breaking Strength (g/tex) Note-2	37.8	31.5
Breaking Elongation %, Note-3	1.2	8.0
Stiffness (f/tex) Note-4	3150	394
Toughness (g/tex) Note-5	0.18	1.44
Thermal conductivity (ca1/sec/cm/^{o}c/cm)	0.91×10^{-4}	1.67×10^{-4}
Density (g/cm^{3})	1.48	1.55
Specific Heat (cal/g/^{o}c)	0.324	0.319

Note- 1: Tex - weight in (g) of 1000 m length.
Note- 2: Breaking strength on Tenacity - load in (g) required to rapture a fibre divided by its fineness in tex.
Note- 3: Breaking elongation % - extension at break by the original length and multiplied by 100.
Note- 4: Stiffness (g/tex) - breaking strengths in (g/tex) divided by the elongation at break per unit length and
Note- 5: Toughness index (g/tex) - ability to absorb work before rapture it is given by the area under elongation curve from the origin to the breaking point.

Table 2. Physico mechanical properties of different (Plain, 2/1 twill & 3/2 twill) finished fabric

Fabric Type	Threads/cm		Weight (gm/sq. meter)	Breaking load (kg)		Standard Deviation		CV%		Cover Factor	
	warp	weft		warp	weft	warp	weft	warp	weft	warp	weft
Plain	17.5	8.81	198	40.1	61.2	4.0	4.92	9.41	8.25	12.98	11.09
2/1Twill	16.5	10.2	211	50.2	92.6	3.0	11.2	7.1	10.92	13.2	14.9
3/2Twill	24	12	246	67.6	53.4	5.92	9.97	7.2	17	19.72	15.20

Table 3. Abrasion (Flat /Plane) text results of Furnishing Fabric

Fabric Type	Weight (gm/sq. meter)	Abrasion Resistance (revs)			Bending Length (cm)	
		Finished	Unfinished	Wollenised Fabric	Warp way	Weft way
Plain	198.0	1150	3100		1.57	4.3
2/1 Twill	211.0	1250	3200	1963	1.50	3.6
3/2Twill	246.0	1250	4500	-	2.60	3.11

RESULTS AND DISCUSSION

The results of tensile strength (Breaking load) of furnishing fabric are shown in the table no.-2 and the abrasion (flat/plane) resistance test results are shown in the table no.-3. According to the British Retail Trading Standard Association (BRTSA), the acceptable abrasion resistance results for woolen and cotton furnishing fabric are as below:

01. Below 1500 revs : Fabric is unacceptable for use other than loose cover
02. 1500-2500 revs : Fabric can be described as possessing moderate resistance to flat abrasion for furnishing.
03. 2500-5000 revs : Fabric can be described as possessing satisfactory resistance to flat abrasion for furnishing.
04. 5000 revs : Fabric is suitable for heavy duties.

At around 2500 revs, BRTSA is recommended and being acceptable for general domestic purposes and the minimum acceptable revs is 1500, when the fabrics were treated with synthetic resin (Shahabuddin *et al.* 1996).

But in case of Furnishing fabric, it is quite different from cotton and wool furnishing fabrics. The requirements of strength and abrasion resistance of a furnishing fabric depend on the purpose of uses. Say, for sofa cover/table cloth more strength and abrasion resistance are required that the curtains and other domestic fabrics. These Furnishing fabrics are free from any resin treatment. The results shown in the table no. 2 & 3 is quite good enough to resist abrasion when it is used as furnishing fabric and it is more economic as because it was simple finished with light bleached & dyed (Platt 1950).

CONCLUSION

The abrasion revs. of an unfinished fabric (3/2 twill) is more than the 4000 revs which is suitable for heavy duties (Table 3). If the Furnishing fabric is treated with synthetic resin then the abrasion revolution will be higher more than 5000 revs, which also can be used for heavy duties. The abrasion resistance of a wollenised fabric is also higher than simple finished fabrics (Table 3).

So, fabric construction and pattern of weaving have great impact on fabric properties. Again due to less abrasion resistance, Furnishing fabrics would be less durable in some uses but these are sufficiently cheap compared to those of conventional furnishing fabrics available in the market.

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